

THURSDAY, DECEMBER 13, 1888.

THE ZOOLOGICAL RESULTS OF THE
"CHALLENGER" EXPEDITION.

Report on the Scientific Results of the Voyage of H.M.S. "Challenger" during the Years 1873-76, under the command of Captain George S. Nares, R.N., F.R.S., and the late Captain Frank T. Thomson, R.N. Prepared under the superintendence of the late Sir C. Wyville Thomson, Knt., F.R.S., &c., Director of the Civilian Staff on board, and now of John Murray, LL.D., Ph.D., &c., one of the Naturalists of the Expedition. Zoology—Vol. XXVII. Published by Order of Her Majesty's Government. (London: Printed for Her Majesty's Stationery Office, and sold by Eyre and Spottiswoode, 1888.)

THE first Report in this volume is by Prof. J. R. Henderson, M.B., on the Anomura. Some time after the return of the *Challenger*, the collection of Anomura was placed in the hands of Dr. Jules Barrois; but, not finding time sufficient for their investigation, Dr. Barrois was compelled to return them, and they were placed in Dr. Henderson's care towards the end of 1884.

This group of Crustacea, taken in the sense of Dana, is intermediate between the Brachyura and the Macrura, but in the classification adopted in this Report the author has, to a certain extent, followed the arrangement of Boas, though retaining the Dromidea and Ranidea within the limits of the group—this latter not without some hesitation.

The Anomura are found in all seas, but much more abundantly in those of tropical or temperate climates; some few forms are terrestrial or fluviatile. The greater number inhabit shallow water or moderate depths; two groups, however, the Pagurids and the Galatheids, are numerously represented in the great ocean depths. The collection contained 161 species or well-marked varieties, referable to fifty-two genera, and of these, over one-half of the species (eighty-six) and seven of the genera are described as new. While some of the common shallow-water forms are absent from the collection, still it adds very considerably to our knowledge of the distribution even of this section.

The main interest, however, is in the deep-sea forms, and these chiefly belong to the Paguridea and the Galatheidea, more than four-fifths of the species taken belonging to these groups, and the latter contains the greater proportion of the species.

While the structural modifications met with in the deep-sea species of the Paguridea are comparatively few and unimportant, in the species of Galatheidea the abyssal forms are blind, and the eyes have undergone a process of degeneration which is tolerably uniform in all. In the majority of the species—with the exception of those belonging to the genus *Munida*—the eggs carried by the females were found to be few in number and of remarkably large size, leading to the inference that their enemies were but few. No facts in reference to their coloration were observed, as the strong alcohol in which

the specimens were preserved reduced them all to a dull white colour. Thirty-one plates accompany this Report.

The second Report is by Prof. P. Pelseneer, on the anatomy of the deep-sea Mollusca. The material for this Report could not be placed in Dr. Pelseneer's hands until the systematic Report on the species had been completed, and it consisted exclusively of Gastropoda (not including Isopleura or Amphineura) of Scaphoda, and of Pelecypoda; there was no great wealth of either species or of specimens. Of certain forms there were but single specimens, and in the case of others the soft parts had been injured in removing them from the shells; still, many new and very interesting facts have been noted and recorded, the chief conclusions from which, so far as the special sense-organs are concerned, are as follows. The organ of vision may atrophy and disappear, in consequence of the absence of sufficient light, in great depths; correlatively, the organs of general sense may multiply, and acquire a high degree of development, such as the labial palps of *Trochus infundibulum*, the siphonal tentacles of varied structure in the deep-sea Anatinacea and in Malletia; and, lastly, the respiratory activity may diminish, and the gills become rudimentary in various ways, or these may retain a great simplicity of structure. Four plates accompany this memoir.

The third Report is by Prof. W. C. McIntosh, F.R.S., on *Phoronis buskii*, n. sp. The genus *Phoronis* was established in 1856, by Dr. Strethill Wright, for a minute Polyzoan, about 1½ millimetre in length. Since this species (*P. hippocrepia*, St. Wright) was described, other species, also of more or less small size, have been described by various authors, from the coasts of Scotland, the Mediterranean, and Eastern America. One, from Australia, is of considerable length. The species dredged by the *Challenger* in shallow water at depths varying from 10 to 20 fathoms (Station 212) south of the Philippine Islands, measures 52 millimetres in length, with an average diameter of about 2 millimetres at the anterior region, and of 4 to 5 millimetres at the enlarged posterior end. The tentacular or branchial region is from 6 to 7 millimetres in length. There has always been a great deal of interest taken in the species of this genus, owing to their strange metamorphosis, and to the uncertainty that seemed to attach to their position in the animal kingdom; this now is settled to be in Ray Lankester's section "Vermiformia," of the Polyzoa. In this Report the minute structure of the *Challenger* species, called after the late George Busk, is given in detail, and figured on four plates. The history of the development of this fine species remains to be written.

The fourth Report is by Prof. W. A. Herdman, on the Tunicata. The first part of this Report, published in 1882, treated of the Simple Ascidians, while the second part, published in 1886, was occupied mainly with an account of the Compound Ascidians, with a supplementary account of some Simple Ascidians which had been found after the publication of the first part. The present part treats of the "free-swimming" Ascidians, which, however, fall into three very distinct groups, less allied to one another than the Simple Ascidia are to the Compound Ascidia. One of these is the group of Salpiform Ascidia; the other two are the Thaliacea, including

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such genera as *Doliolum* and *Salpa*, and the *Larvacea*, containing the *Appendicularia*.

By far the greater number of the pelagic Tunicata collected during the voyage of the *Challenger* belonged to the genus *Salpa*. Of these, vast numbers were taken at the various stations, so that a great deal of labour was spent in a critical examination of these before it could be determined that they were all the same or different species.

The collection of pelagic Tunicata contained about twenty-six species, of which nine are new to science. No new genera are established, but a new family, the *Octacnemidæ*, has been formed for the reception of the remarkable deep-sea genus described by Moseley as *Octacnemus*.

Prof. Herdman gives in some detail, at the close of his account of the species and of their geographical and bathymetrical distribution, the conclusions at which, after a prolonged study of this group, he has arrived, as to their relationship and phylogeny; this is accompanied by a graphic representation of the phylogeny of the Tunicata. This important Report is illustrated by eleven plates.

THE BRITISH FARMER AND HIS COMPETITORS.

The British Farmer and his Competitors. By W. E. Bear. (London: Cassell and Co., Limited, 1888.)

THIS small volume of 160 pages is in some respects a reprint of articles published in the *Quarterly Review*, revised and brought down to date. The first chapter is devoted to the condition of British agriculture, in which the somewhat Radical doctrines of the Farmers' Alliance (an organization which has never succeeded in winning the confidence of the farmers) are promulgated. "Before this country will be cultivated to the best advantage, those who cultivate it must be either the owners of their farms, or tenants who are entitled to sell their improvements to the highest bidder, and who are free to crop the land as they please, provided that they be liable for actual damage done to the property of the owner." "Our farmers must have complete security for their capital invested in improvements, and freedom of enterprise as well, if they are to do the best they can with the land." This is the panacea for agricultural distress, and yet we may well ask why it is that Britain is exceptionally well cultivated, and that farmers as a rule farm as well or better than landlords? Landlord farming has, in fact, for the most part not been satisfactory, either when carried out on the large or on the small scale, and whether any advantage would accrue from its extension is exceedingly doubtful. Allotments, too, are put forward as amongst the requirements of our time, and small farming is also advocated, although condemned by experience.

Mr. Bear is more happy as a statistician than as a politician, and his chapters upon foreign competition and the prospects of the wheat-grower, and the breeder and feeder of live stock, are deeply interesting. The first welcome truth is that in almost all articles of agricultural production the crisis of injurious foreign competition appears to have been passed about the year 1883 or

earlier. Such was the case up to date, with regard to wheat, barley, oats, and cattle. The maximum importation of sheep, hops, and potatoes, took place in 1882; of bacon, hams, and preserved meats in 1880; of pigs and cheese in 1878; and of beans in 1877. It must be understood that quantities in quarters and hundredweights, and not values, are indicated; and so considerable has been the shrinkage that the present imports of meat fall short of the maximum reached some eight years ago by about one million hundredweights, chiefly bacon.

Taken in connection with this diminution of foreign supplies of grain and meat, is to be noted the increase in population, not only at home and in Europe, but throughout our colonies and in the United States. In the last-named country alone, population has increased from 38,500,000 in 1870 to 62,500,000 at the beginning of the present year, and it is estimated that it will have reached 66,000,000 by 1890. During the five years ending with 1884 the average annual consumption of wheat in the United States was nearly 324,000,000 bushels, and the average export was 140,000,000 bushels. If the production in the five years ending with 1894 does not become greater, all but 43,000,000 bushels, or less than 5,500,000 quarters, will be required for home consumption, and the surplus will not suffice for the increased population of the next five years. Thus, unless the area of wheat-growing is greatly extended, the United States must cease to be a wheat-exporting country before the close of the present century! There is certainly a somewhat large "if" to swallow in accepting this statement, but it seems pretty evident that wheat-growing is not profitable at present prices, and that American farmers are becoming tired of it. Higher prices can alone cause the necessary increased supply, and the influence of such higher prices would be found in Europe to the advantage of the farmers. Considerable space is devoted to show that American and Canadian farmers grow wheat at a direct loss. It appears that the average gross money return from an acre of wheat in the United States is £1 13s. This figure is based on official information, and is arrived at by a yield of 12·2 bushels per acre, and a price of 68·1 cents. the bushel. As, however, the farmers have been often obliged to sell at 48 cents. per bushel, and the yield is in one State, not 12·2 but, 5 bushels, and in another 7 bushels, and in eight States it is below 8 bushels, the gross value of an acre of wheat must in many cases fall much below the average. It is held that unless 20 to 25 bushels can be secured no profit is possible. The cost of growing an acre of wheat in the States cannot, it appears, be placed under 14·11 dollars per acre, *i.e.* about or near £2 18s.; and if these figures are even approximately correct, the wheat-growers of the Far West must be in a worse plight than our own. Although nominally rent free, the Western farmers have generally been obliged to mortgage their farms at an interest of from 8 to 10 per cent. per annum, and according to one authority, "teams, tools, stock, and grain, all are being rapidly mortgaged." It is generally admitted that the American farmer's life as a rule is one of "excessive and almost incessant toil, and the scantiest reward—in money, at any rate; while his wife is held up in America as a common object of pity." With such encouragement, Mr. Bear does not expect wheat-growing to spread in America unless prices generally rise.